

# Workflow Guidance using XR and Gesture-Driven User Interaction, Phase I

Completed Technology Project (2018 - 2019)



## Project Introduction

Access to up-to-date information, with contextual relevance, is critical to advancing the mission objectives for human exploration in space. Crew efficiency and safety depends on the associated workflows.

The proposed project aims to develop a new user experience (UX) for information visualization, with a custom user interface (UI), navigated via micromovement sensors. This innovation allows crew members to access visual data, even while their hands are occupied during a maintenance/support task.

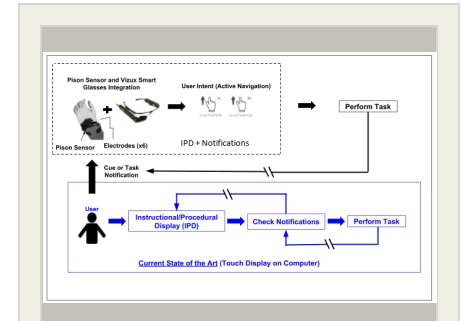
This proprietary control functionality (Pison device) will be combined with commercially-available X-R (Augmented, Hybrid, and Virtual Reality) technology. The Pison device utilizes neuromuscular and Inertial Measurement Unit (IMU) inputs, which are translated into a UI control signal. The UI will be displayed on smart glasses, which allows for navigation of procedures, while visual cues and unobtrusive non-visual notifications are also presented to the user.

This system will be tested in a simulated environment, on the ground, to ensure acceptability for end-users. The proposed proof-of-concept trial will incorporate the display/navigation of step-by-step instructions, response to notifications, and assembly of a physical object. The user will maintain visual access to their surroundings, as well as the procedural instructions. In addition, the system can query the user's attention through notifications (auditory/haptic), which the user will acknowledge using the Pison device. Subjective and objective measures of task performance and efficiency will be collected in order to refine the hardware design. This will allow for future integration of the technology into standard mission workflow and on-board systems (Phase II).

## Anticipated Benefits

The proposed X-R system may be applied to mission-related maintenance tasks. In addition, this same system may be used to display and navigate crew timelines, as well as procedures and supporting documentation linked to calendar events. Beyond the crew capsule, the system may also be used in the space suit environment with integration into a heads-up display.

The proposed system could be modified for industries with extensive safety and efficiency goals for remote workers. This includes the oil and gas, pharmaceutical, construction, and automotive industries.



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## Table of Contents

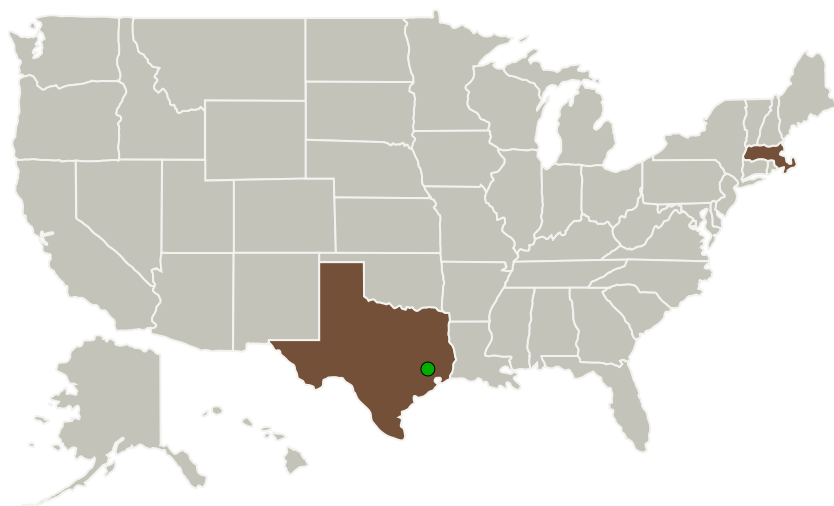
Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	2
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Images	3
Technology Areas	3
Target Destinations	3

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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Pison Technology Incorporated	Lead Organization	Industry	Boston, Massachusetts
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

## Primary U.S. Work Locations

Massachusetts	Texas
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## Project Transitions

**July 2018:** Project Start**February 2019:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140155>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Pison Technology Incorporated

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

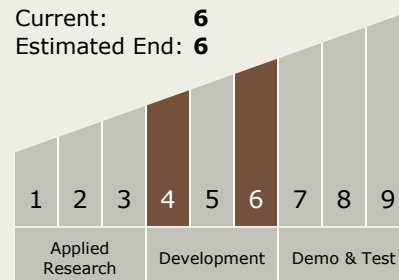
Carlos Torrez

**Principal Investigator:**

Salil Patel

## Technology Maturity (TRL)

Start: 4  
 Current: 6  
 Estimated End: 6

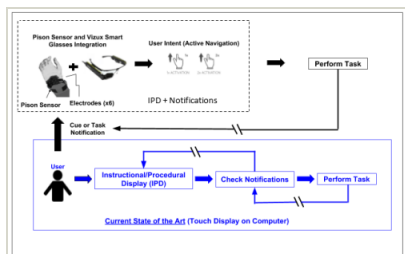


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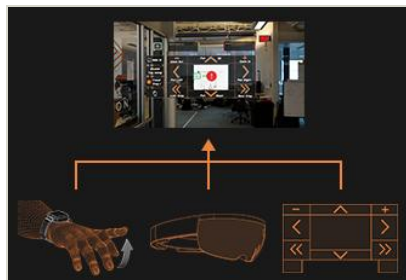
## Images



### Briefing Chart Image

Workflow Guidance using XR and Gesture-Driven User Interaction, Phase I

(<https://techport.nasa.gov/image/133317>)



### Final Summary Chart Image

Workflow Guidance using XR and Gesture-Driven User Interaction, Phase I

(<https://techport.nasa.gov/image/127501>)

## Technology Areas

### Primary:

- TX07 Exploration Destination Systems
  - └ TX07.3 Mission Operations and Safety
    - └ TX07.3.2 Integrated Flight Operations Systems

## Target Destinations

The Moon, Mars, Earth